

# *In silico* assessment of a computerised model-based glycaemic control approach in a Belgian medical intensive care unit

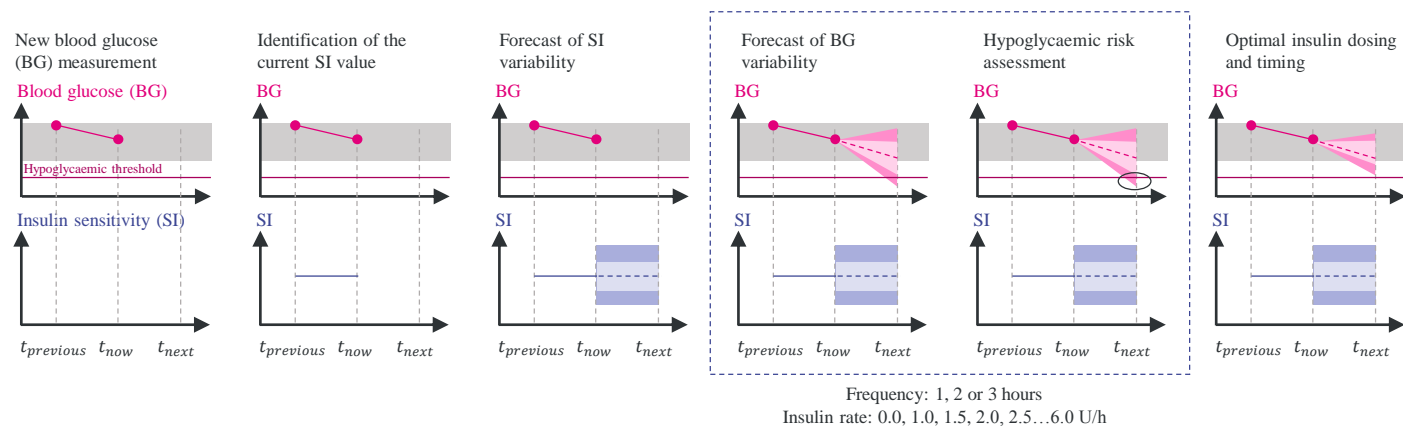
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**Problem:** Critical illness → Stress-induced hyperglycaemia  
Reduced insulin sensitivity  
Glycaemic variability → Increased mortality

**Solution:** Model-based glycaemic control: exogenous insulin/nutrition inputs → Dosing ? Timing ?

## (1) STAR framework

Insulin-only, target-to-range, patient-specific and adaptive glycaemic control approach



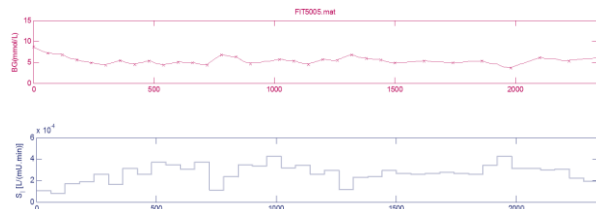
## (2) Virtual patients

Identification of insulin sensitivity (SI) profile

Number of patients	20
% of males	45.0
Age (years)	68.0 [54.0-76.0]
SAPS II score	67.0 [51.0-76.0]
Initial glycaemia (mmol/L)	8.5 [7.3 - 9.9]

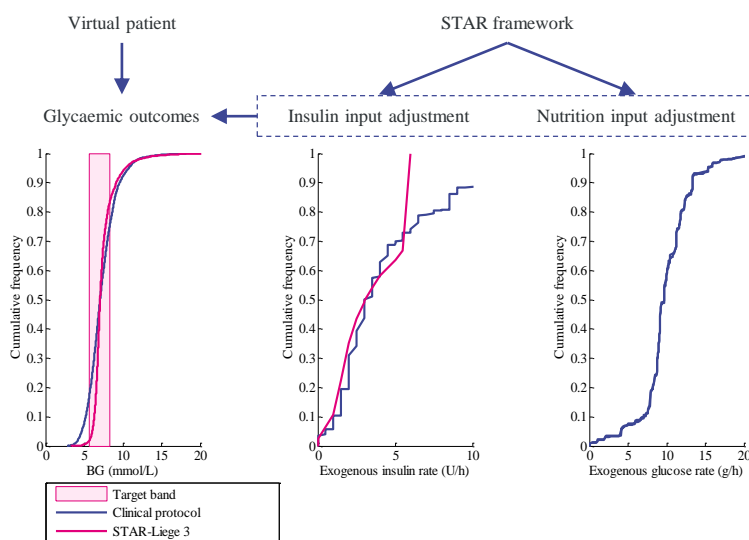
Clinical data (glycaemic levels, insulin and nutrition rates/timing)

Virtual patient  
(hourly SI values)



## (3) Virtual trials

*In silico* assessment of the efficiency, safety and performance of the STAR framework



	Clinical protocol	STAR-Liege 3
Total hours	5009	5014
Number of measurements	2125	1912
Blood glucose (BG) levels (mmol/L)	7.0 [6.1 - 8.3]	7.0 [6.7 - 7.7]
% BG ≥ 10.0 mmol/L	7.76	6.12
% BG within 8.3-10.0 mmol/L	17.04	10.47
% BG within 5.6-8.3 mmol/L	58.98	81.82
% BG within 4.4-5.6 mmol/L	13.12	1.49
% BG < 4.4 mmol/L	3.10	0.10
% BG < 4.0 mmol/L	1.23	0.04
% BG < 2.2 mmol/L	0.00	0.00
Number of patients with BG < 2.2 mmol/L	0	0
Exogenous insulin rate (U/h)	3.0 [2.0 - 6.5]	3.5 [2.0 - 6.0]
Exogenous glucose rate (g/h)	9.7 [8.8 - 11.7]	9.7 [8.8 - 11.6]

Reduction of clinical workload  
Safe, effective glycaemic control

STAR = big improvement over the current clinical protocol

## (4) Clinical trials

Assessment of the efficiency, safety and performance in a real, clinical environment (in progress)